PATENT
ATTORNEY DOCKET NO. 0074/037001

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Hiroki FURUKAWA
U.S. Patent No. 7,292,669
Date of Patent: November 6, 2007
Filed : December 9, 2003
Title: NULL SYMBOL DETECTION DEVICE

Art Unit: 2611
Examiner: Flores, L.
Application No.: 10/730,271

ATTENTION: CERTIFICATE OF CORRECTIONS BRANCH
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

REQUEST FOR CERTIFICATE OF CORRECTION

Sir:

In reviewing the above-identified patent, a printing error was discovered therein requiring correction in order to conform to the Official Record in the application.

The error noted is set forth on the attached copy of Form PTO/SB/44 (09-07) in the manner required by the Commissioner's Notice.

1) Upon reviewing the patent it was noted that in claim 5, lines 38-53, found at column 14, "buffer of said synchronous addition buffer group, an average value of adjacent m sampling values is calculated and the sampling point is successively moved, and for detecting the minimum value of the moving average operation and the address of said at least one of synchronous addition buffer providing the minimum value for the transmission mode to be received;

a threshold calculating unit for calculating thresholds for detecting a transmission mode by said synchronous addition data stored in said synchronous at least one addition buffer; and

a transmission mode determining unit for comparing the minimum value of the moving average operation calculated in said moving average processing unit with a threshold calculated in said threshold calculating unit to determine the transmission mode to be received." should be deleted and the following text added in its place --number by data corresponding to the time width of the moving average operation.--

2) It was also noted that in claim 7, lines 7-9, found at column 15, the phrase "period equal to a synchronous addition period of said at least one of synchronous addition buffer." should be deleted and the following text added in its place --synchronous addition buffer of said synchronous addition buffer group, an average value of adjacent m sampling values is calculated and the sampling point is successively moved, and for detecting the minimum value of the moving average operation and the address of said at least one of synchronous addition buffer providing the minimum value for the transmission mode to be received;

a threshold calculating unit for calculating thresholds for detecting a transmission mode by said synchronous addition data stored in said synchronous at least one addition buffer; and

a transmission mode determining unit for comparing the minimum value of the moving average operation calculated in said moving average processing unit with a threshold calculated in said threshold calculating unit to determine the transmission mode to be received.--

3) It was also noted that in claim 8, lines 15-17, found at column 15, the phrase "synchronous addition number by data corresponding to the time width of the moving average operation" should be deleted and the following text added in its place --period equal to a synchronous addition period of said at least one of synchronous addition buffer.--

It is submitted that no fee is necessary for this request, as this error was incurred by the U.S. Patent and Trademark Office (USPTO). Please see the enclosed copy of the Amendment under 37 CFR 1.111 filed on May 8, 2007 resulting in the Notice of Allowance and Notice of Allowability dated July 17, 2007, for the correct claim language information. If the USPTO determines that it is necessary to charge the Certificate of Correction fee, the USPTO staff person in charge of this issue should contact the

undersigned to discuss obtaining authorization to charge this fee to our Deposit Account.

Accordingly, applicant respectfully requests the USPTO to issue the Certificate of Correction for this patent.

If there are any questions regarding this application, please telephone the undersigned at the telephone number listed below.

Respectfully submitted,

Date: January 4, 2008

Randolph A. Smith
Reg. No. 32,548

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ISSUE DATE : November 6, 2007

INVENTOR(S) : Hiroki FURUKAWA

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 14

in claim 5, lines 38-53 "buffer of said synchronous addition buffer group, an average value of adjacent m sampling values is calculated and the sampling point is successively moved, and for detecting the minimum value of the moving average operation and the address of said at least one of synchronous addition buffer providing the minimum value for the transmission mode to be received; a threshold calculating unit for calculating thresholds for detecting a transmission mode by said synchronous addition data stored in said synchronous at least one addition buffer; and

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a transmission mode determining unit for comparing the minimum value of the moving average operation calculated in said moving average processing unit with a threshold calculated in said threshold calculating unit to determine the transmission mode to be received." should read -- number by data corresponding to the time width of the moving average operation.--

Column 15

in claim 7, lines 7-9, "period equal to a synchronous addition period of said at least one of synchronous addition buffer." should read --synchronous addition buffer of said synchronous addition buffer group, an average value of adjacent m sampling values is calculated and the sampling point is successively moved, and for detecting the

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minimum value of the moving average operation and the address of said at least one of synchronous addition buffer providing the minimum value for the transmission mode to be received;

a threshold calculating unit for calculating thresholds for detecting a transmission mode by said synchronous addition data stored in said synchronous at least one addition buffer; and

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a threshold calculating unit for calculating thresholds for detecting a transmission mode by said synchronous addition data stored in said synchronous at least one addition buffer; and

a transmission mode determining unit for comparing the minimum value of the moving average operation calculated in said moving average processing unit with a threshold calculated in said threshold calculating unit to determine the transmission mode to be received.--

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Applicant: Hiroki FURUKAWA
Application No.: 10/730,271
Filed : December 9, 2003
Title : NULL SYMBOL DETECTION DEVICE

Art Unit: 2611
Examiner: Flores, L.

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

AMENDMENT UNDER 37 CFR 1.111

Sir:

In response to the Office Action dated February 8, 2007, please amend the application as follows:

Amendments to the Specification begin on page 2 of this paper.

Amendments to the Claims begin on page 3 of this paper.

Remarks begin on page 19 of this paper.

AMENDMENTS TO THE SPECIFICATION

Please substitute the paragraph beginning at page 12, line 8 and ending at page 12, line 24 to read as follows:

-- Herein, the moving average operation will be described. In the moving average operation, when times t_k, t_{k+1}, t_{k+2}, ... are sampling timings for an inputted signal, n sampling points are allocated to sampling points of a received signal in a frame (with a frame period of TF). Then, received signals x_j, x_{j+1}, x_{j+2}, ... x_{j+m-1} at m ($m << n$) adjacent sampling timings t_j, t_{j+1}, t_{j+2}, ... t_{j+m-1} are added and the resultant added value serves as a moving average value X_j. For the moving average ~~vale~~ value X_j, the value of j is shifted backward on a time base from the initial value, so that moving average values X1, X2, ... Xn at n positions in each of frames for the respective modes can be obtained. Among the n moving average values X, the minimum moving average value is determined as Xmin and the address of Xmin is treated as a candidate for the position of a null symbol in the corresponding frame. Because this minimum value is obtained by adding positive values, it is a positive value. --

AMENDMENTS TO THE CLAIMS

Please substitute the following claims for the pending claims with the same numbers respectively:

Claim 1 (Currently amended): A null symbol detection device used for receivers for a digital broadcasting system which repeatedly transmits a null symbol with smaller transmission power than those of other symbols during a fixed period, ~~which has at least one transmission mode,~~ where at least one of a null symbol repetition period and a null symbol width is different depending on at least one transmission mode, and in which the longer said null symbol repetition period becomes, the wider said null symbol width becomes, said null symbol detection device comprising:

an amplitude detector operable for detecting an envelope of at least one of an intermediate frequency signal and a baseband signal;

a synchronous addition buffer group having ~~at least one~~ a plurality of synchronous addition ~~buffer~~ buffers for synchronously adding data obtained by sampling an output of said

amplitude detector at a fixed sample period during said null symbol repetition period corresponding to said at least one of transmission modes to be received;

a transmission mode determination processor operable for performing a moving average operation upon all synchronous addition data rows stored in said at least one of synchronous addition ~~buffer~~ buffers of said synchronous addition buffer group, and for determining a transmission mode by detecting, with respect to a transmission mode to be received, a minimum value of the moving average operation and an address of said at least one of synchronous addition ~~buffer~~ buffers providing the minimum value; and

a null position detector operable for detecting, in accordance with a transmission mode determined in said transmission mode determination processor, a null symbol position from the address providing the minimum value of the moving average operation, and for generating a synchronous pulse at a start point of the null symbol position.

Claim 2 (Original): A null symbol detection device according to claim 1, wherein

said transmission mode determination processor includes:

a moving average processing unit for performing a moving average operation in which, with respect to all of the synchronous addition data rows stored in at least one synchronous addition buffer of said synchronous addition buffer group, an average value of adjacent m sampling values is calculated and the sampling point is successively moved, and for detecting the minimum value of the moving average operation and the address of said at least one synchronous addition buffer providing the minimum value for the transmission mode to be received;

a correction processing unit for correcting the minimum value of the moving average operation for each of the transmission modes performed in said moving average processing unit in accordance with a synchronous addition number and a time width of the moving average operation; and

a transmission mode determining unit for comparing corrected minimum values of the moving average operation for the respective transmission modes to determine the transmission mode to be received.

Claim 3 (Original): A null symbol detection device according to claim 2, wherein

the time width of the moving average operation in said moving average processing unit is equal to or less than the null symbol width of transmission mode having null symbol repetition period equal to a synchronous addition period of said at least one synchronous addition buffer.

Claim 4 (Original): A null symbol detection device according to claim 2, wherein

in said synchronous addition buffer group, synchronous addition is performed for numbers predetermined for each of said synchronous addition buffers, and a time period required for the synchronous addition is equal to a time period of said buffers with different synchronous addition periods.

Claim 5 (Original): A null symbol detection device according to claim 2, wherein

said correction processing unit normalizes the minimum value of the moving average operation calculated in said moving average processing unit by a value obtained by multiplying the

synchronous addition number by data corresponding to the time width of the moving average operation.

Claim 6 (Original): A null symbol detection device according to claim 2, wherein

said transmission mode determining unit compares the minimum value of the moving average operation corresponding to each of the transmission modes corrected in said correction processing unit with a predetermined threshold, and detects the minimum value among results of the moving average operation smaller than the predetermined threshold to determine a transmission mode, and when the minimum value smaller than the predetermined threshold is not provided, determines that a determination of the transmission mode is impossible.

Claim 7 (Original): A null symbol detection device according to claim 1, wherein

said transmission mode determination processor includes:

a moving average processing unit for performing a moving average operation in which, with respect to all of the synchronous addition data rows stored in said at least one of

synchronous addition buffer of said synchronous addition buffer group, an average value of adjacent m sampling values is calculated and the sampling point is successively moved, and for detecting the minimum value of the moving average operation and the address of said at least one of synchronous addition buffer providing the minimum value for the transmission mode to be received;

a threshold calculating unit for calculating thresholds for detecting a transmission mode by said synchronous addition data stored in said synchronous at least one addition buffer; and

a transmission mode determining unit for comparing the minimum value of the moving average operation calculated in said moving average processing unit with a threshold calculated in said threshold calculating unit to determine the transmission mode to be received.

Claim 8 (Original): A null symbol detection device according to claim 7, wherein

the time width of the moving average operation in said moving average processing unit is equal to or less than the null symbol width of a transmission mode having null symbol repetition

period equal to a synchronous addition period of said at least one of synchronous addition buffer.

Claim 9 (Original): A null symbol detection device according to claim 7, wherein

said synchronous addition buffer group performs the synchronous addition for same synchronous addition numbers regardless of the null symbol repetition period.

Claim 10 (Original): A null symbol detection device according to claim 7, wherein

said transmission mode determining unit detects all of the transmission modes to be received and, when detection of transmission mode cannot be performed successfully, outputs a mode undefined message indicating that the detection of the transmission mode to be received is impossible.

Claim 11 (Original): A null symbol detection device according to claim 2, wherein

the transmission mode to be received is in conformity with European Digital Audio Broadcasting (DAB) standard (ETS300401).

Claim 12 (Original): A null symbol detection device according to claim 7, wherein

the transmission mode to be received is in conformity with European Digital Audio Broadcasting (DAB) standard (ETS300401).

Claim 13 (Original): A null symbol detection device according to claim 11, wherein

said synchronous addition buffer group has three buffers which perform synchronous addition with periods of 24 msec, 48 msec and 96 msec, respectively.

Claim 14 (Original): A null symbol detection device according to claim 12, wherein

said synchronous addition buffer group has three buffers which perform synchronous addition with periods of 24 msec, 48 msec and 96 msec, respectively.

Claim 15 (Original): A null symbol detection device according to claim 11, wherein

in said synchronous addition buffer group, when a sample period of synchronous addition data in the synchronous addition buffer with a period of 24 msec is 1, a sample period of synchronous addition data in the synchronous addition buffer with a period of 48 msec is 2, and a sample period of synchronous addition data in the synchronous addition buffer with a period of 96 msec is 4.

Claim 16 (Original): A null symbol detection device according to claim 12, wherein

in said synchronous addition buffer group, when a sample period of synchronous addition data in the synchronous addition buffer with a period of 24 msec is 1, a sample period of synchronous addition data in the synchronous addition buffer with a period of 48 msec is 2, and a sample period of synchronous addition data in the synchronous addition buffer with a period of 96 msec is 4.

Claim 17 (Original): A null symbol detection device according to claim 16, wherein

in said synchronous addition buffer group, by using data sampled in the same period regardless of the synchronous addition period, the synchronous addition buffer with a period of 96 msec synchronously adds average values for four sample data, the synchronous addition buffer with a period of 48 msec synchronously adds average values for two sample data, and the synchronous addition buffer with a period of 24 msec synchronously adds one sample data.

Claim 18 (Original): A null symbol detection device according to claim 11, wherein

said moving average processing unit performs a moving average operation upon the number of samples corresponding to 0.5 τ to 1.0 τ in which τ indicates the null symbol width of the respective transmission modes.

Claim 19 (Original): A null symbol detection device according to claim 12, wherein

said moving average processing unit performs a moving average operation upon the number of samples corresponding to 0.5

τ to 1.0 τ in which τ indicates the null symbol width of the respective transmission modes.

Claim 20 (Original): A null symbol detection device used for receivers for a digital broadcasting system which repeatedly transmits a null symbol with smaller transmission power than those of other symbols during a fixed period, which has at least one transmission mode, where at least one of a null symbol repetition period and a null symbol width is different depending on at least one transmission mode, and in which the longer said null symbol repetition period becomes, the wider said null symbol width becomes, said null symbol detection device comprising:

an amplitude detector operable for detecting an envelope of at least one of an intermediate frequency signal and a baseband signal;

a synchronous addition buffer group having at least one synchronous addition buffer for synchronously adding data obtained by sampling an output of said amplitude detector at a fixed sample period during said null symbol repetition period corresponding to said at least one of transmission modes to be received;

a transmission mode determination processor operable for performing a moving average operation upon all synchronous addition data rows stored in said at least one of synchronous addition buffer of said synchronous addition buffer group, and for determining a transmission mode by detecting, with respect to a transmission mode to be received, a minimum value of the moving average operation and an address of said at least one synchronous addition buffer providing the minimum value; and

a null position detector operable for detecting, in accordance with a transmission mode determined in said transmission mode determination processor, a null symbol position from the address providing the minimum value of the moving average operation, and for generating a synchronous pulse at a start point of the null symbol position,

said transmission mode determination processor includes:

a moving average processing unit for performing a moving average operation in which, with respect to all of the synchronous addition data rows stored in at least one synchronous addition buffer of said synchronous addition buffer group, an average value of adjacent m sampling values is calculated and the sampling point is successively moved, and for detecting the

minimum value of the moving average operation and the address of said at least one synchronous addition buffer providing the minimum value for the transmission mode to be received;

a correction processing unit for correcting the minimum value of the moving average operation for each of the transmission modes performed in said moving average processing unit in accordance with a synchronous addition number and a time width of the moving average operation; and

a transmission mode determining unit for comparing corrected minimum values of the moving average operation for the respective transmission modes to determine the transmission mode to be received.

Claim 21 (Original): A null symbol detection device used for receivers for a digital broadcasting system which repeatedly transmits a null symbol with smaller transmission power than those of other symbols during a fixed period, which has at least one transmission mode, where at least one of a null symbol repetition period and a null symbol width is different depending on at least one transmission mode, and in which the longer said

null symbol repetition period becomes, the wider said null symbol width becomes, said null symbol detection device comprising:

an amplitude detector operable for detecting an envelope of at least one of an intermediate frequency signal and a baseband signal;

a synchronous addition buffer group having at least one synchronous addition buffer for synchronously adding data obtained by sampling an output of said amplitude detector at a fixed sample period during said null symbol repetition period corresponding to said at least one of transmission modes to be received;

a transmission mode determination processor operable for performing moving average operation upon all synchronous addition data rows stored in said at least one of synchronous addition buffer of said synchronous addition buffer group, and for determining a transmission mode by detecting, with respect to a transmission mode to be received, a minimum value of the moving average operation and an address of said at least one synchronous addition buffer providing the minimum value; and

a null position detector operable for detecting, in accordance with a transmission mode determined in said

transmission mode determination processor, a null symbol position from the address providing the minimum value of the moving average operation, and for generating a synchronous pulse at a start point of the null symbol position,

said transmission mode determination processor includes:

a moving average processing unit for performing a moving average operation in which, with respect to all of the synchronous addition data rows stored in said at least one of synchronous addition buffer of said synchronous addition buffer group, an average value of adjacent m sampling values is calculated and the sampling point is successively moved, and for detecting the minimum value of the moving average operation and the address of said at least one of synchronous addition buffer providing the minimum value for the transmission mode to be received;

a threshold calculating unit for calculating thresholds for detecting a transmission mode by said synchronous addition data stored in said synchronous at least one addition buffer; and

a transmission mode determining unit for comparing the minimum value of the moving average operation calculated in said moving average processing unit with a threshold calculated in

said threshold calculating unit to determine the transmission mode to be received.

REMARKS

By this amendment, the specification has been editorially amended and claim 1 has been amended in the application. Currently, claims 1-21 are pending in the application.

The indication that claims 20-21 are allowed is noted with appreciation. Also, the indication that claims 2 and 7 contain allowable subject matter is noted with appreciation.

The specification was objected to because a typographical error was found in the specification. By this amendment, the term "vale Xj" on page 12, line 16 of the specification has been amended to "value Xj". Therefore, it is respectfully submitted that this objection has been overcome and should be withdrawn.

Claim 1 was rejected under 35 USC 103(a) as being obvious over Kim (U.S. Patent No. 7,006,577) in view of Nomura (U.S. Patent No. 6,731,702).

This rejection is respectfully traversed in view of the remarks below.

The present invention relates to a null symbol detection device used for receivers in a digital broadcasting system in which a null symbol repetition period or a null symbol width is

different depending on transmission modes (see page 1, lines 5-9 of the specification).

A null symbol detection device 10A illustrated in Fig. 2 is configured so as to include an amplitude detector 11, a synchronous addition buffer group 12, a transmission mode determination processor 13A, a sample clock generator 18 and a null position detector 19. The transmission mode determination processor 13A has a moving average processing unit 14, a correction processing unit 15 and a transmission mode determining unit 16 (see page 10, lines 7-14 of the specification).

The transmission mode determination processor 13A performs a moving average operation upon all of synchronous addition data rows stored in the respective synchronous addition buffers of the synchronous addition buffer group 12, and detects the minimum value of the moving average operation and the address of a synchronous addition buffer providing this minimum value. On the basis of the minimum value of the moving average operation and the address of the synchronous addition buffer, a transmission mode is determined.

The moving average processing unit 14 calculates a moving average operation value (also referred to as the moving average)

of all synchronous addition data stored in the synchronous addition buffer group 12, i.e., the first to third synchronous addition buffers 12a to 12c, and outputs the minimum value of the moving average operation and the address of a synchronous addition buffer providing the minimum value.

The null position detector 19 detects, as a null symbol start position, the start address providing the minimum value of the moving average operation corresponding to the transmission mode that was determined in the transmission mode determining unit 16. Specifically, the null position detector 19 outputs, for the start address position, a pulse which is synchronous with the sample clock generator 18. Thus, the null position detector 19 detects the null position (see page 13, lines 16-24 of the specification).

Independent claim 1 recites a null symbol detection device including:

"a transmission mode determination processor operable for performing a moving average operation upon all synchronous addition data rows stored in said at least one of synchronous addition buffers of said synchronous addition buffer group, and for determining a transmission mode by detecting, with respect to

a transmission mode to be received, a minimum value of the moving average operation and an address of said at least one synchronous addition buffers providing the minimum value; and

a null position detector operable for detecting, in accordance with a transmission mode determined in said transmission mode determination processor, a null symbol position from the address providing the minimum value of the moving average operation, and for generating a synchronous pulse at a start point of the null symbol position".

These features are not shown or suggested by Kim, Nomura or any combination of these references. Specifically, none of these references have a transmission mode detection processor using a moving average operation and determining a transmission mode by a minimum value of the moving average. Also, none of these references have a null position detector for detecting a null symbol position based on the transmission mode determined by the mode determination processor.

Kim relates to an apparatus and method for detecting a transmission mode in a digital audio receiver adopting an orthogonal frequency division multiplexing (OFDM) scheme for broadcasting, and more particularly, to an apparatus and method

for detecting each transmission mode by detecting the starting and ending points of an OFDM signal (see col. 1, lines 10-16).

Kim discloses that in FIG. 4, the mode detection apparatus includes an analog-to-digital converter (ADC) 210, a square value calculation unit 230, a null symbol length calculation unit 250 and a mode determination unit 270 (see col. 5, lines 9-12).

Kim also discloses that the null symbol location detector 256 determines the starting point of a null symbol by detecting a minimum square value output from the sum of squares ratio calculator 254 for the first search period, and determines the end point of the null symbol by detecting a maximum mean square value output from the sum of squares ratio calculator 254 for the second search period. Then, the null symbol location detector 256 outputs a search period control signal for changing one of the first and second search periods to the other search period.

Although the starting point of a null symbol a minimum mean square value output from the sum of squares ratio calculator 254 for the first search period to be has been determined with the minimum mean square value, if the sum of squares ratio calculator 254 calculates the mean square value by dividing m2(k) by m1(k), the starting and end points of a null symbol may be determined

with the maximum and minimum mean square values, respectively (see col. 5, lines 46-64).

Kim also discloses that the null symbol length of each sample is calculated by detecting the starting and end points Nstart and Nend of the null symbol of each sample using the square values calculated in step S130 (step S150). In step 170, the null symbol length calculated in step S150 is compared with predetermined range of the null symbol length for each mode, thereby determining a transmission mode (see col. 6, lines 20-28).

Kim does not disclose a transmission mode determination processor operable for performing a moving average operation upon all synchronous addition data rows stored in said at least one of synchronous addition buffers of said synchronous addition buffer group, and for determining a transmission mode by detecting, with respect to a transmission mode to be received, a minimum value of the moving average operation and an address of the at least one synchronous addition buffers providing the minimum value as claimed in independent claim 1.

Kim also does not disclose a null position detector operable for detecting, in accordance with a transmission mode determined

in the transmission mode determination processor, a null symbol position from the address providing the minimum value of the moving average operation, and for generating a synchronous pulse at a start point of the null symbol position as claimed in independent claim 1.

Applicant respectfully submits that the mode determination unit 270 of Kim is different from the transmission mode determination processor 13A of the present invention because the transmission mode determination processor 13A of the present invention determines a transmission mode by detecting a minimum value of the moving average operation as described above.

Also, applicant respectfully submits that the null symbol length calculation unit 250 of Kim is different from the Null position detector 19 of the present invention because a null position detector 19 detects a null symbol position from the address providing the minimum value of the moving average operation as described above.

For these reasons, it is believed that Kim does not show or suggest the presently claimed features of the present invention. Applicant also submits that Nomura does not make up for the deficiencies in Kim.

Nomura relates to a null symbol position detecting method and a null symbol position detecting apparatus for detecting a null symbol from signals such as a DAB (Digital Audio Broadcast) signal for example and to a receiver for receiving such a signal including null symbols (see col. 1, lines 8-12).

Nomura discloses that in Fig. 1, the DAB receiver comprises an antenna 1, a front-end section (a receive and tune-in section) 2, an A/D converter 3, an I/Q demodulator 4, an automatic frequency controller (AFC) 5, a Fast Fourier Transform section (FFT) 6, a Viterbi decoder 7, an MPEG decoder 8, a D/A converter 9, an output terminal 10, a controller based on DSP (Digital Signal Processor) 11, a D/A converter 12, and a voltage-controlled crystal oscillator (VCXO) 13 (see col. 5, lines 28-38).

Nomura also discloses that the AFC 5, to which the null symbol position detecting method and apparatus, detects the position of the null symbol included in the received and tuned-in DAB signal and supplies the data obtained by this processing to the controller 11 (see col. 5, lines 54-59)

Nomura does not disclose a transmission mode determination processor operable for performing a moving average operation upon

all synchronous addition data rows stored in said at least one of synchronous addition buffers of said synchronous addition buffer group, and for determining a transmission mode by detecting, with respect to a transmission mode to be received, a minimum value of the moving average operation and an address of the at least one synchronous addition buffers providing the minimum value as claimed in independent claim 1.

Nomura also does not disclose a null position detector operable for detecting, in accordance with a transmission mode determined in the transmission mode determination processor, a null symbol position from the address providing the minimum value of the moving average operation, and for generating a synchronous pulse at a start point of the null symbol position as claimed in independent claim 1.

It is therefore respectfully submitted that Kim, Nomura, individually or in combination, do not teach, disclose or suggest the presently claimed invention and it would not have been obvious to one of ordinary skill in the art to combine these references to render the present claims obvious.

In view of foregoing claim amendments and remarks, it is respectfully submitted that the application is now in condition

for allowance and an action to this effect is respectfully requested.

If there are any questions or concerns regarding the amendments or these remarks, the Examiner is requested to telephone the undersigned at the telephone number listed below.

Respectfully submitted,

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